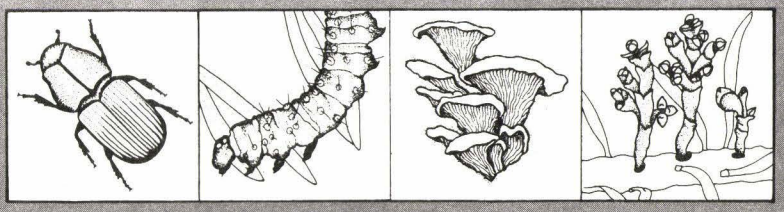
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AN EVALUATION OF CONE AND SEED INSECTS IN SELECTED SEED PRODUCTION AREAS IN REGION 1 (Progress Report II)

by

Jerald E. Dewey and Michael J. Jenkins 1/

ABSTRACT

Insect damage was extensive to Douglas-fir, ponderosa pine, western white pine, and western larch cones at most seed production areas surveyed in 1979. From 70 to 100 percent of the cones from several collecting periods were injured. Moderate damage (40-70 percent of cones injured) occurred to Douglas-fir, ponderosa pine, western larch, and western white pine from a few areas. Light damage (less than 40 percent) occurred on western white pine cones from a few seed production areas, and to all lodgepole pine and western hemlock cones collected.

The primary insect species observed were western spruce budworm on Douglas-fir and western larch; midges on Douglas-fir, western larch, ponderosa pine, and lodgepole pine; cone worms on Douglas-fir, western larch, and ponderosa pine; and the Douglas-fir cone moth on Douglas-fir.

INTRODUCTION

Seventy-two seed production areas (SPA's) and one seed orchard have been established or planned in the Northern Region (figure 1). With the establishment comes the need for continuous management, including protection of cones from insects. Currently few control alternatives have been developed for cone and seed insects of western conifers. Prior to development of control techniques the problem insects must be precisely identified, their biologies understood, and their impacts defined.

In 1978 we initiated a survey of the Northern Region's SPA's to identify on the basis of area and tree

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species those insects seriously affecting seed production. This survey, which included a damage assessment, was continued in 1979. It is our intent to continue this effort until we have surveyed each SPA during years of light, moderate, and heavy cone crops because insect complexes, population levels, and subsequent injury differ with host, area, and fluctuation of cone crop size.

This report summarizes our observations of 1979.

OBJECTIVES

The objectives of this evaluation are:

1. Determine the primary cone- and seed-feeding insects on a host basis at each existing and presently planned seed production area in the Region.

2. Describe the type of injury and quantify the amount of injury caused by each insect species.

3. Where possible, correlate extent of cone and seed injury with such factors as habitat type, elevation, stand age, and stocking density.

This information is to be ultimately used to develop insect management systems for SPA's where intolerable losses occur.

METHODS

Methods used in 1979 were identical with those of 1978 (Dewey and Jenkins 1979) except for cone collection. In addition to 1978 collecting methods, small caliber (.218 and .22/.250) rifles were used for shooting off cone-bearing branches when other approaches were not feasible.

RESULTS

Sixty-seven SPA's were visited in 1979 to assess their suitability for monitoring cone and seed insects.

For most tree species throughout the Region, 1979 was a poor cone year. Of the 67 SPA's examined, only 29 had sufficient cones to allow collecting, and only 18 of those had enough cones for three or more collections throughout the summer. Survey results are presented in table 1.

DISCUSSION

Much variability is being observed in the extent and type of cone and seed injury caused by insects. Some tree species, such as Douglas-fir, are severely affected by a wide variety of insects at most locations, whereas other tree species, such as lodgepole pine, are only slightly impacted by just a few insect species throughout the Region.

Cone crops are naturally very sporadic; many species produce good crops at intervals of 5 years or more. Cone collection for regeneration during years of light or moderate cone production should be discouraged, for seed quality will likely be inferior due to insect predation.

Seed production area management should include a fall or winter assessment of the potential cone crop for the following spring. This

can be done by counting first year cones on the pines and by dissecting buds of Douglas-fir, true firs, and spruce. If the potential exists for a large cone crop, plans should be made for protecting and harvesting it. Survey data should be reviewed to determine the impacts of different insects at that site during years of comparable cone crops. Control alternatives should be evaluated if records suggest insect control will be necessary. Appropriate Environmental Assessment Reports or Environmental Impact Statements are then prepared.

Equipment and manpower needs for cone harvesting must be assessed early enough to insure that large numbers of cones can be collected. Viability of stored seed is good for most tree species for 10 or more years. Hence, if sufficient cones are collected during bumper crop years, seed inventories can be used until the next bumper crop. This is the most economical time for cone collecting and the time when seed quality is highest.

REFERENCES CITED

Dewey, Jerald E., and Michael J. Jenkins, 1979. An evaluation of cone and seed insects in selected seed production areas in Region 1. (Progress Report). USDA-Forest Service, Forest Insect and Disease Management, Report No. 79-16.

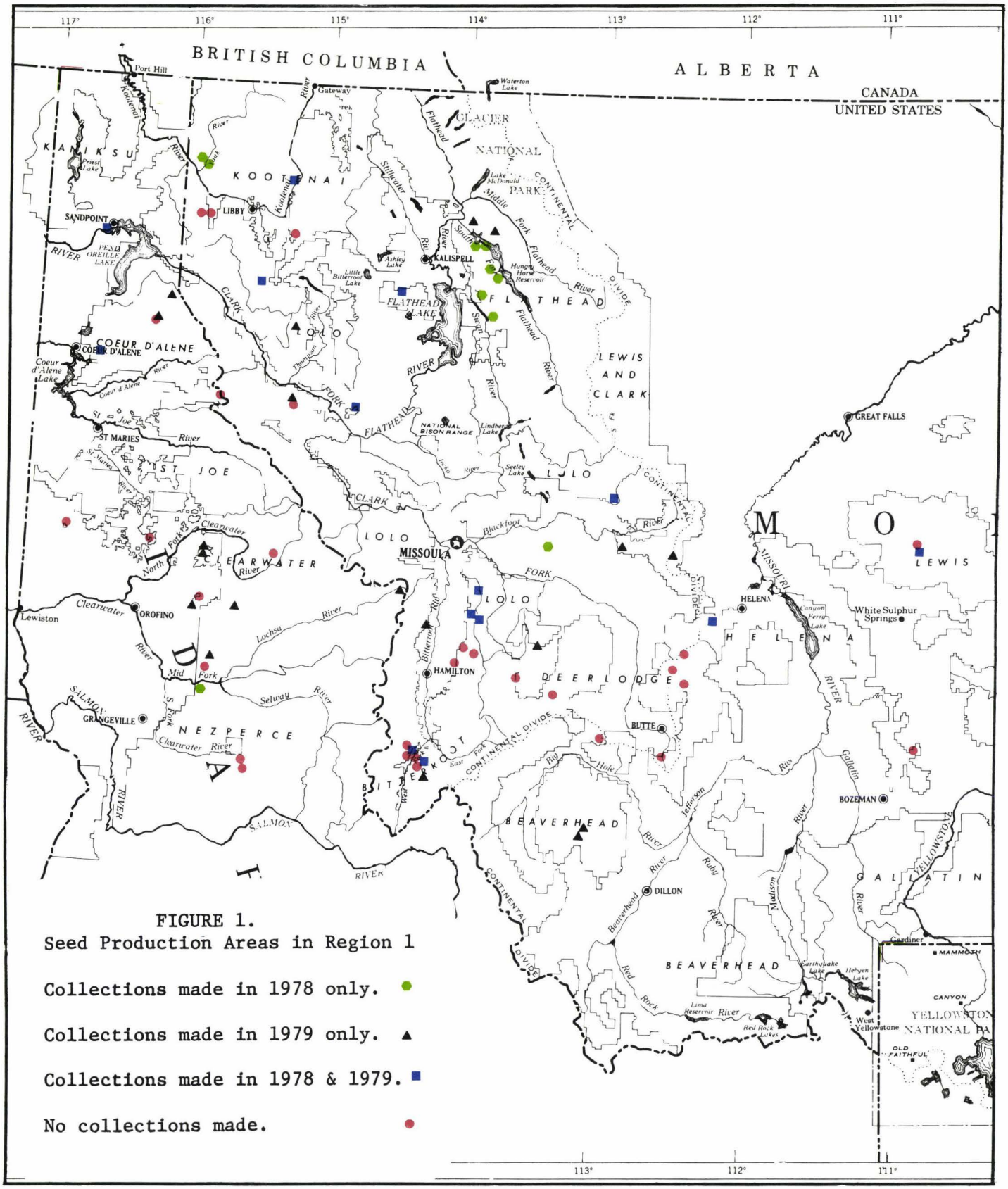


FIGURE 1.
Seed Production Areas in Region 1

Collections made in 1978 only. ●

Collections made in 1979 only. ▲

Collections made in 1978 & 1979. ■

No collections made. ●

Table 1. Seed production areas sampled to date and extent of injury observed.

SPA	Tree 1/ species	Cone crop size 2/ 1978	Cone crop size 2/ 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
BEAVERHEAD NF								
Elkhorn #1	LPP	-	L	-	7/26	-	25	unknown
				-	9/25	-	12	unknown
Elkhorn #2	LPP	-	L	-	7/26	-	6	unknown
Upper Prairie Cr.	LPP	-	L	-	9/5	-	0	-
Cat Cr.	DF	-	N	-	-	-	-	-
BITTERROOT NF								
Big Cr.	PP	N	VL	-	7/11	-	100	cone worm
Buck Cr.	LPP	M	M	-	6/20	-	15	unknown
				7/19	7/10	7.5	0	midges
				8/8	8/1	5	0	midges
				8/24	8/22	17.5	30	midges; unknown
Eight Mile Cr.	DF	M	L		6/19		83	spruce budworm; cone moth
				7/19	7/12	70	78	spruce budworm; cone moth; cone worm

1/ LPP = lodgepole pine; DF = Douglas-fir; PP = ponderosa pine; WL = western larch; ES = Engelmann spruce; WWP = western white pine; WH = western hemlock; SAF = subalpine fir; GF = grand fir.
2/ N = none; VL = very light; L = light; M = moderate; H = heavy.

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Eight Mile Cr. continued				8/10	8/12	31	100	cone moth; cone worm;
				8/25	8/21	57.5	78	cone moth; cone worm; maggots; midges
Slocum/Claremont Cr.	LPP	M	M	-	6/19		5	spruce budworm
				7/20	7/9	12.5	5	unknown
				8/9	8/2	7.5	8	midges; unknown
				8/25	8/23	7.5	5	midges; unknown
South Ambrose Cr.	WL	VL	M	-	6/19	-	10	spruce budworm
				7/20	7/9	62.5	10	spruce budworm; midges
				8/8	8/2	34	35	midges; cone moth
				8/24	8/23	77.5	18	midges; unknown
				9/14	-	34	-	unknown
Wheeler Cr.	PP	M	L	-	6/20	-	45	cone worm
				-	7/10	-	35	cone worm
				8/8	8/1	7.5	40	cone worm; midges; maggots
				8/24	8/22	37.5	59	cone worm; midges; maggots
Soda Springs	DF	N	VL	-	-	-	-	-
Lower Ditch Cr.	LPP	VL	L	-	-	-	-	-
Gold Cr.	LPP	L	M	-	-	-	-	-

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Signal Cr.	ES	-	N	-	-	-	-	-
Eastman Cr.	ES	N	VL	-	-	-	-	-
Ward Cr.	DF	-	L	-	-	-	-	-
Gemmel Cr.	PP	-	L	-	-	-	-	-
Little Boulder	PP	-	N	-	-	-	-	-
CLEARWATER NF								
Bertha Hill	WWP	?	?	-	8/8 8/29	- -	43 37	cone worm; unknown cone worm
Browns Meadow	PP	-	N	-	-	-	-	-
Canal Gulch	WWP	-	N	-	-	-	-	-
Cold Springs	DF	VL	VL	-	-	-	-	-
Fan Saddle	PP	N	VL	-	-	-	-	-

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Jungle Point	DF	L	N	-	-	-	-	-
McGary Cr.	WL	-	VL	-	8/7	-	37	midges; unknown
					8/29	-	70	midges; cone worm
Packer Meadows	LPP	?	?	-	8/30	-	0	-
Pete Cr.	WWP	-	N	-	-	-	-	-
Powder House Cr.	WWP	-	L	-	6/14	-	100	mountain pine cone beetle
					7/19	-	5	cone worm
					8/9	-	20	cone worm
Savage Camp	WL	N	L	-	7/18	-	25	midges; unknown
					8/8	-	23	midges; unknown
					8/29	-	43	midges; cone worm; unknown
DEERLODGE NF								
Bear Gulch	?							
Beaver Cr.	?							
Black Pine	DF	-	L	-	7/6	-	14	spruce budworm; cone moth
					7/25	-	78	spruce budworm; cone moth

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Black Pine continued					8/17	-	80	cone moth; cone worm; midges
					9/4	-	80	cone worm; midges; maggots
Blodget Gulch	DF	-	N	-	-	-	-	-
N. Fk. Red Rock Cr. ?								
Rock Cr.	LPP	-	N	-	-	-	-	-
Sheep Cr.	DF	-	N	-	-	-	-	-
	LPP	-	N	-	-	-	-	-
FLATHEAD NF								
Bond Cr.	DF	M	N	7/11	-	22.5	-	spruce budworm; unknown
				8/1	-	78.6	-	spruce budworm; unknown
				8/22	-	55.0	-	midges; cone worm
				9/12	-	17.5	-	midges; cone worm
Coram Exp. For.	WL	-	M	-	6/29	-	10	unknown
					7/17	-	50	spruce budworm; cone worm
					8/19	-	10	cone worms; midges
Emery Cr.	DF	-	?		7/17	-	88	cone moth; spruce budworm

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Flossy Cr.	WL	VL	VL	-	-	-	-	-
Forest Cr.	WL	-	VL	-	-	-	-	-
Goldie Cr.	WL	?						
Lid Cr.	WL	L	VL	7/12	-	4.9	-	unknown
				8/12	-	0	-	unknown
				8/23	-	47.5	-	midges; unknown
				9/13	-	15.0	-	unknown
Mount Cr.	WL	VL	L	-	6/6	-	46	maggots
				-	6/28	-	33	maggots
				-	7/19	-	5	unknown
				-	8/9	-	88	midges
				8/22	8/28	20.5	12	midges; unknown
				9/11	-	20.5	-	midges
Wolf Cr.	DF	M	N	7/11	-	15	-	spruce budworm
				8/11	-	12	-	midges
				8/22	-	15	-	midges
	PP	M	N	7/11	-	20	-	cone worm
				8/1	-	37	-	cone worm
				8/22	-	50	-	cone worm; unknown

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
GALLATIN NF								
Battle Ridge	DF	VL	N	-	-	-	-	-
HELENA NF								
Chimney Cr.	DF	-	L	-	6/22	-	80	spruce budworm
					8/1		100	cone worm; cone moth; midges
					8/23		100	cone worm; cone moth; midges
Colorado Mtn.	LPP	M	M	6/29	6/21	2.5	0	unknown
				7/20	7/11	37.5	10	cone worm; unknown
				8/9	7/31	25.0	35	cone worm; unknown
				9/7	8/22	0	13	cone worm; unknown
Cooper's Lake	WL	VL	L	7/21	7/12	50	0	unknown
				8/18	8/23	57.5	12	cone worm; midges; maggots
				9/8	-	2.5	-	unknown
McQuithy Gulch	DF	VL	L	-	6/21	-	60	spruce budworm
					7/11		90	spruce budworm; cone worm
					7/31		88	cone worm; cone moth; maggots
					8/22		93	midges; cone worm; cone moth
IDAHO PANHANDLE NF'S								
Cathedral Peak	WWP	H	L	-	-	-	-	-

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Halfway Peak	LPP	-	M	-	7/6	-	8	unknown
	WH	-	M	-	7/6	-	1	unknown
	SAF	-	N	-	-	-	-	-
	ES	-	VL	-	-	-	-	-
	GF	-	N	-	-	-	-	-
	WL	-	L	-	-	-	-	-
	WWP	-	?	-	7/6	-	29	unknown
Kelly Mtn.	DF	L	VL	-	6/28	-	100	cone moths; spruce budworm
				7/16	-	31		spruce budworm; cone worm; cone moths
				8/8	-	57		cone moth; spruce budworm; midges; cone worm
				8/30	-	31		midges; cone worm
	WWP	L	M	-	-	-	-	-
	WWP	L	M	-	-	-	-	-
	GF	-	VL	-	-	-	-	-
	WL	-	VL	-	-	-	-	-
Mullen	WL	-	N	-	-	-	-	-
Sandpoint Seed Orchard	WWP	H	VL	?	?	?		
Spyglass	DF	?	?					

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
KOOTENAI NF								
Bristow Cr.	DF	M	VL	6/28	6/27	11.3	100	cone moths; spruce budworm; cone worm
				7/27	7/18	30.0	96	cone moths; cone worm; midges
				8/15	8/7	48.8	100	cone worm; cone moths; midges
				9/7		54.4	-	cone worm; midges
	PP	?	?	-	6/27	-	100	cone worm
Coyote Flat	PP	M	N	6/28	-	63.3	-	cone worm
				7/27	-	32.5	-	cone worm; midges
Fisher Cr.	LPP	L	L	6/27	6/28	3.3	15	midges
				7/26	8/7	2.5	15	midges
				8/14	8/28	0	16	midges
				9/6	-	0	-	-
Pony Mtn.	DF	-	N	-	-	-	-	-
	PP	-	N	-	-	-	-	-
Rocky Cr.	PP	L	N	8/16	-	-	-	cone worm
Stanley Cr.	WL	-	N	-	-	-	-	-
	GF	-	N	-	-	-	-	-
	DF	-	N	-	-	-	-	-

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Tamarack/Deer Gulch	DF	-	N	-	-	-	-	-
LEWIS & CLARK NF								
Moose Cr.	LPP	-	M	-	6/20	-	0	-
	DF	-	L	-	8/21		3	cone worm
				-	-	-	-	-
Moose Park	LPP	-	L	-	-	-	-	-
LOLO NF								
CC Divide	DF	VL	L	-	7/13	-	33	spruce budworm; cone worm
					7/23		53	spruce budworm; cone worm
					8/14		56	cone worm; unknown
	LPP	VL	N	-	-	-	-	-
	WL	VL	VL	-	-	-	-	-
Henry Cr.	DF	M	N	7/13	-	95	-	spruce budworm
	PP	M	L	-	6/8	-	20	unknown
				7/13	7/2	39	85	cone worm
				-	7/24	-	67	cone worm
				8/31	8/15	60	96	cone worm; midges
	WL	VL	L	-	6/8	-	93	spruce budworm
				7/13	7/2	76.7	55	spruce budworm
				-	7/24	-	30	spruce budworm; midges
				8/31	8/15	42.5	35	midges

SPA	Tree species	Cone crop size 1978	Cone crop size 1979	Collection dates 1978	Collection dates 1979	Percent cones damaged 1978	Percent cones damaged 1979	Primary pests
Lower Radio Cr.	WL	-	L	-	6/7	-	15	unknown
					7/3		13	spruce budworm
					7/24		30	spruce budworm; midges
					8/15		11	midges
Twelve Mile Cr.	WL	N	N	-	-	-	-	-
NEZPERCE NF								
Campbell Cr.	DF	-	VL	-	-	-	-	-
Potatoe Hill	GF	H	VL	7/12	-	30	-	cone worm; unknown
				8/2		50		cone worm; midges
				8/24		32.5		cone worm
Wheeler Mtn.	WL	-	VL	-	-	-	-	-
BLM								
Union Peak	DF	?	VL	7/21	-	56.3	-	spruce budworm
				8/17	-	62.8	-	spruce budworm; unknown